

1. An isolated nucleic acid molecule encoding a polypeptide which has 2,5-DKG permease activity.

5 comprising a nucleotide sequence having at least 40%
identity to a nucleotide sequence selected from the group
consisting of SEQ ID NOS:1, 3, 5, 7, 9 and 11.

10 identity to a nucleotide sequence selected from the group
consisting of SEQ ID NOS:1, 3, 5, 7, 9 and 11.

comprising a nucleotide sequence selected from the group consisting of SEQ ID NOS:1, 3, 5, 7, 9 and 11.

comprising a nucleotide sequence which encodes a polypeptide having at least 40% identity to an amino acid sequence selected from the group consisting of SEQ ID NOS:2, 4, 6, 8, 10 and 12.

comprising a nucleotide sequence which encodes a polypeptide having at least 80% identity to an amino acid sequence selected from the group consisting of SEQ ID NOS:2, 4, 6, 8, 10 and 12.

15. A bacterial cell, comprising the vector of claim 13.

16. The bacterial cell of claim 15, wherein said isolated nucleic acid molecule comprises a nucleotide
5 sequence which encodes a polypeptide having an amino acid sequence at least 80% identical to an amino acid sequence selected from the group consisting of SEQ ID NO:2, 4, 6, 8, 10 and 12.

17. The bacterial cell of claim 16, wherein said
10 amino acid sequence is at least 95% identical to SEQ ID NO:8.

18. The bacterial cell of claim 17, further comprising an isolated nucleic acid molecule comprising a nucleotide sequence which encodes a polypeptide having an
15 amino acid sequence at least 95% identical to SEQ ID NO:4.

19. The bacterial cell of claim 17, further comprising an isolated nucleic acid molecule comprising a nucleotide sequence which encodes a polypeptide having an amino acid sequence at least 95% identical to SEQ ID NO:10.

20. The bacterial cell of claim 15, which is of the genus *Klebsiella*.

21. The bacterial cell of claim 15, which is deficient in endogenous 2,5-DKG activity.

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34. The method of claim 31, wherein said bacterial cell is a *Klebsiella oxytoca* deficient in *yiaX2*.

35. The method of claim 31, wherein said bacterial cell comprises an isolated nucleic acid molecule encoding a polypeptide having at least 80% identity to SEQ ID NO:14 and 2-keto reductase activity, and a polypeptide
5 having at least 80% identity to SEQ ID NO:16 and 5-keto reductase activity.

36. A method of using the isolated nucleic acid molecule of claim 1 to enhance 2-KLG production, comprising expressing the polypeptide encoded by said nucleic acid
10 molecule in a bacterial which expresses an enzyme that catalyzes the conversion of 2,5-DKG to 2-KLG.

37. The method of claim 36, wherein said bacterial cell further expresses enzymes that catalyze the conversion of glucose to 2,5-DKG.

15 38. The method of claim 37, wherein said bacterial cell is deficient in endogenase 2-keto reductase activity.

39. The method of claim 36, wherein said
20 bacterial cell is of the genus *Pantoea*.

40. The method of claim 36, further comprising converting said 2-KLG to ascorbic acid.

41. An isolated polypeptide which has 2,5-DKG permease activity.

5 43. The isolated polypeptide of claim 41,
comprising an amino acid sequence having at least 80%
identity to an amino acid sequence selected from the group
consisting of SEQ ID NOS:2, 4, 6, 8, 10 and 12.

45. The isolated polypeptide of claim 41,
comprising at least 10 contiguous amino acids of any of SEQ
ID NOS:2, 4, 6, 8, 10 and 12.

47. An antibody specific for the isolated polypeptide of claim 44.

20 48. An antibody specific for the isolated peptide
of claim 46.